

## AMENDMENT TO THE CLAIMS

1. (Currently Amended) A photodetector, comprising:  
~~a plurality of semiconductor materials forming a heterojunction, the plurality of semiconductor materials comprising:~~  
~~a first semiconductor layer consisting of a first semiconductor material;~~  
~~a second semiconductor layer consisting of a second semiconductor material coupled to the first semiconductor material, the first and second semiconductor layers forming a heterojunction, the first and second semiconductor materials being halides, wherein at least one of the first and second semiconductor materials consists of a semiconductor material.~~
2. (Original) The photodetector of claim 1, wherein the first and second semiconductor materials have approximately the same band gap.
3. (Original) The photodetector of claim 1, wherein the first semiconductor material comprises an iodide compound and the second semiconductor material comprises mercuric iodide.
4. (Original) The photodetector of claim 3, wherein the first semiconductor material comprises lead iodide.
5. (Original) The photodetector of claim 1, further comprising:  
a first contact; and  
a second contact, wherein the first plurality of semiconductor materials are disposed between the first and second contacts.
6. (Original) The photodetector of claim 5, wherein at least one of the first and second contacts comprises palladium.
7. (Original) The photodetector of claim 5, wherein the second semiconductor material comprises mercuric iodide and the first semiconductor material is less chemically reactive than mercuric iodide with the contacts.
8. (Original) The photodetector of claim 1, wherein the second semiconductor material is thicker than the first semiconductor material.

9. (Original) The photodetector of claim 8, wherein the first semiconductor material has a first thickness less than approximately 250 microns.
10. (Original) The photodetector of claim 9, wherein the first semiconductor material has a first thickness less than approximately 50 microns.
11. (Original) The photodetector of claim 4, wherein the second semiconductor material is thicker than the first semiconductor material.
12. (Original) The photodetector of claim 11, wherein the first semiconductor material has a first thickness less than approximately 250 microns.
13. (Currently Amended) A photodetector, comprising:  
~~a plurality of semiconductor materials forming a heterojunction, the plurality of semiconductor materials comprising:~~  
a first semiconductor layer consisting of a first semiconductor material and having a band gap of approximately 2.1 eV;  
a second semiconductor layer consisting of a second semiconductor material and having a band gap of approximately 2.3 eV coupled to the first semiconductor material, the first and second semiconductor materials being halides, ~~the first and second semiconductor layers forming a first heterojunction, wherein at least one of the first and second semiconductor materials consists of a semiconductor material;~~  
wherein the second semiconductor material comprises mercuric iodide, and the first semiconductor material comprises lead iodide;  
wherein the plurality of semiconductor materials further comprises ~~a third semiconductor layer consisting of a third semiconductor material comprising lead iodide and having a band gap of approximately 2.1 eV~~ coupled to the second semiconductor material, ~~the second and third semiconductor layers forming a second heterojunction;~~ and  
wherein the first semiconductor material has a first thickness less than approximately 50 microns, the second semiconductor material has a second thickness greater than approximately 250 microns, and the third semiconductor material has a third thickness less than approximately 50 microns.

14. (Original) The photodetector of claim 4, wherein the plurality of semiconductor materials further comprises a third semiconductor material comprising lead iodide coupled to the second semiconductor material.
15. (Original) The photodetector of claim 14, wherein the third semiconductor material has a third thickness less than approximately 50 microns.
16. (Original) The photodetector of claim 1, wherein the second semiconductor material has a conductivity type different than the first semiconductor material.
17. (Original) The photodetector of claim 16, wherein the band gaps of the first and second semiconductor materials are within 10 percent of each other.
18. (Previously Presented) The photodetector of claim 17, wherein the first semiconductor material comprises lead iodide and the second semiconductor material comprises mercuric iodide and each of the first and second semiconductor materials consists of a semiconductor material.
19. (Currently Amended) A photodetector, comprising:  
~~a plurality of semiconductor materials forming a heterojunction, the plurality of semiconductor materials comprising:~~  
a first semiconductor layer consisting of a first semiconductor material;  
a second semiconductor layer consisting of a second semiconductor material  
coupled to the first semiconductor material, the first and second semiconductor layers forming a heterojunction, the first and second semiconductor materials being halides,  
wherein at least one of the first and second semiconductor materials consists of a semiconductor material;  
wherein the second semiconductor material has a conductivity type different than the first semiconductor material;  
wherein the band gaps of the first and second semiconductor materials are within 10 percent of each other;  
wherein the first semiconductor material comprises mercuric iodide and the second semiconductor material comprises lead iodide; and  
wherein the second semiconductor material is thicker than the first semiconductor material.

20. (Original) The photodetector of claim 18, wherein the plurality of semiconductor materials further comprises a third semiconductor material comprising lead iodide coupled to the second semiconductor material.
21. (Original) The photodetector of claim 1, wherein at least one of the first and second semiconductor materials comprises an iodide compound and wherein the first semiconductor material comprises bismuth iodide.
22. (Original) The photodetector of claim 21, wherein the second semiconductor material comprises mercuric iodide.
23. (Previously Presented) The photodetector of claim 21, wherein the second semiconductor material comprises lead iodide.
24. (Original) The photodetector of claim 1, wherein one of the first and second semiconductor materials comprises an iodide compound and the other of the first and second semiconductor materials comprises thallium bromide.
25. (Original) The photodetector of claim 24, wherein the one of the first and second semiconductor materials that comprises an iodide compound further comprises mercuric iodide.
26. (Original) The photodetector of claim 24, wherein the one of the first and second semiconductor materials that comprises an iodide compound further comprises lead iodide.
27. (Original) The photodetector of claim 1, wherein the photodetector is coupled to a negative bias.
28. (Original) The photodetector of claim 5, wherein the first contact is coupled to ground and the second contact is coupled to a negative voltage.
29. (Original) The photodetector of claim 8, wherein the first contact is coupled to ground and the second contact is coupled to a negative voltage.
- 30-48. (Canceled)
49. (Currently Amended) A photodetector, comprising:

~~a plurality of semiconductor materials forming a heterojunction, the plurality of semiconductor materials comprising:~~

~~a first semiconductor layer consisting of a p-type first semiconductor material; and~~

~~a second semiconductor layer consisting of a n-type second semiconductor material coupled to the first semiconductor material, the first and second semiconductor layers forming a heterojunction, the first and second semiconductor materials consisting essentially of halides, wherein at least one of the first and second semiconductor materials consists essentially of a semiconductor material.~~

50. (Previously Presented) The photodetector of claim 49 wherein the first semiconductor material is lead iodide and the second semiconductor material is mercuric iodide.

51. (New) The photodetector of claim 1 wherein the first semiconductor layer is a single first semiconductor material, and the second semiconductor layer is a single second semiconductor material.